ABSTRACT:

In this paper, we propose using an input packet with multiple wavelengths to achieve semiconductor optical amplifier (SOA) gain uniformity for high speed optical applications. Rapid SOA gain recovery is a key factor to minimise the output gain standard deviation which results in reducing the system penalties. The SOA is modelled using a segmentation scheme and its theoretical analysis is presented. The output gain standard deviation of an input packet of Gaussian pulses using single wavelength is compared to multiple wavelengths. Output results showed significant improvement of 6, 7.7, 8.7, 8.5 and 8.2 dB in the SOA gain uniformity employing the proposed technique at input rates of 10, 20, 40, 80 and 160 Gb/s, respectively. The same comparison between both techniques is repeated maintaining a fixed packet time duration of 1 ns. The limitations of the proposed technique regarding the applied bias current are also studied at all input data rates.